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Perspectives of the Farmers on Collection of Vegetables at Dambulla Dedicated Economic Center in Sri Lanka

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Abstract
Agricultural products move through several channels before reaching the final consumers. The collection process of vegetable must be effective and efficient to avoid losses in the supply chain of vegetables. The Dambulla Dedicated Economic Center (DDEC) is considered as the main hub of vegetable and fruit distribution in Sri Lanka. The objective of this research is to analyze the role of DDEC in collection of vegetables in Sri Lanka and explore whether the center meets the best practices of vegetable collection. Transportation, packing and packaging, role of middlemen, and training and knowledge on vegetable collection process were reviewed. Data were collected using a semi structured questioner from 70 farmers linked to the DDEC. High level of quality degradation, poor packing and packaging, lack of knowledge and training on collection, and inefficient role of middlemen were identified as the main issues related to the vegetable collection process of DDEC in Sri Lanka.

Keywords: *Dambulla Dedicated Economic Centers, DDEC, Vegetable Collection, Vegetable Supply Chain*

Introduction

The production of fruit and vegetables around the world has grown in an increasing rate compared to cereal crops (Ayalew, 2015). The total value of horticulture crops which are traded in the current business world is doubled compared to cereal crops (Lumpkin & Weinberg et al, 2005). During 2020, the agricultural sector in Sri Lanka has contributed 8.36 percent to the GDP of the country which is on an increasing rate compared to7.54 percent in the year 2019. Out of the total labour force in the country, the agriculture industry accounts for 29 percent of the total labor force (CBSL, 2020). From the entire agricultural sector which contribute to the Sri Lankan economy, vegetable production sector is identified as the second largest sub sector after the paddy production. Every year, nearly 733,400 metric tons of different varieties of vegetables are produced by categorizing them into two groups as up-country and low-country vegetables depending on the region they are grown. The difference between up-country and low-country is that up-country vegetables are produced throughout the year while low country vegetables are grown only during certain seasons (HARTI, 2005).

The Sri Lankan traditional vegetable supply chain is consisted of moving vegetables from the producers to the end customers and this process is subject to several types of inefficiencies and drawbacks, such as excess supply, wastage in excess loading in transportation, poor packing and packaging, and improper warehouse and storage practices. As identified by Gunatilake et al. (1992) there are several drawbacks aligned with collection of vegetables in Sri Lankan market. Most of the farms are based in very isolated rural areas and the distance to the main road has made this industry very competitive and costly for small scale local farmers. Another reason would be the less bargaining power due to various credit bound issues with buyers and the farmers get exploited when the transactions happen. According to the authorities of Dambulla Dedicated Economic Center (DDEC), 20 percent of the harvest is wasted while being transported due to improper delivery techniques. The Ministry of Internal Trade and Cooperatives has found that over 30 percent of vegetables and fruits get wasted at DDEC. Therefore, analyzing the prevailing collection process of vegetables in the Sri Lankan market has become more important for taking actions towards setting up a smooth and efficient vegetable collection process in the country.

Literature Review

To fulfill the consumer needs in supply chain management of fruits and vegetable are driven by several players such as farmers, local traders, retailers, processors etc. As mentioned by Viswanadham (2007) when a hotricultural product reaches to its' final customers, the products passed through six to seven different distribution channels. The perishable food items are received to the end customers via a chain of intermediaries who carry out different functions such as transfering of the ownership of the commodities, movement of the products, maintanence and the preservation of quality and quantity, payment to the sellers and also the delivering of commodities to the final buyers (Halder & Pati, 2011). As mentioned by the USAID (2005), middlemen tend to control the sector through actions such as creating new distribution networks and setting up facilities for certain fruits and vegetables. Many supermarkets tend to create a strong long-term relationship with the middlemen who they like to make sure that continuous supply is happened (GoK, 2003). The link between farmers and the market is very important to strengthen the sub-sector since the vegetable and fruit industry is highly controlled by the middlemen. The vegetable market in Sri Lanka this is mainly handled by the private sector (Vidanapathirana, 2008). The marketing operatons are considered to be very important when deciding the farmers' profit and the consumer availability. The higher marketing cost and the increased levels of market margins are the major issues in the Sri Lankan vegetable market in the present context. The insufficient education on the methods of value addition can be identified as a major challenge or a drawback in the current market of Sri Lanka. The farmers with a lesser knowledge in the crop production may result in excessive production of crops during each season. Lack of post-harvest handling methods and less access to the information on the value addition to the process are some key issues that arise due to the less training and education on the process (Serem, 2010).

Infrastructure facilities have an important role in the proper collection of the vegetables. The improvement of rural roads will reduce the frequent road closures during the rainy seasons and it reduces the cost of vehicle operations, minimize the traffic volume, enhance the access to the market and other facilities and also improves the passenger services (The World Bank., 1996). Villages which are consisted with proper road networks have enhanced situation where agricultural production and the income are in a higher level compared to the villages which have a poor network (Raisuddin & Hossain, 1990). The development of the main roads, construction of bridges, maintenance of the rural roads helps in the increased participation of the vendors to the local market, increasing of the availability of the different agricultural products and also it enhances the geographic size of the market for different agricultural products (Torbjorn & Bharat, 2012). Proper road facilities and other infrastructure facilities reduce the farm gate prices of the products which are manufactured (Torbjorn & Bharat, 2012). Further, Bhalla (2000) mentioned that marginal cost can be reduced as result of proper transportation facilities and it can create profit margins to the farmers. The proper transportation is one of the main factors for the higher production and farmers can get benefits from this since it will reduce the transportation cost of the agricultural products to the market.

The vegetable collection practices creates a general framework to develop commercial relationship between shops, supermarkets and their suppliers inclusing the farmers (Chen, et al, 2005). The procurement or the collection of vegetables require higer frequesncy, constant delivery and also quality that does not changes daily. In the international context the delivery arrangements between growers and supermarkets are based on the output characters which are easily observable such as size, colour and volume. The buyers tries to make management decisions for the growers to reduce the uncertain conditions on the desired product qualities (Ruben, et al, 2007). It is important to have quality control for these products since buyers tend to face problems regulary when monitoring the freshness and the shelf –life of the products. Therefore, to gurantee a reliable supply the retailers seek for a sustainable relationship with the producers which minimize the infromation and cost to enhance the trust among agents in the chain (Ruben, et al., 2007).

Methodology

The purpose of the study was to analyze the perspectives of the farmers on collection of vegetables at Dambulla Dedicated Economic Center in Sri Lanka under the areas of transport to the market from the field, packing and packaging at the harvesting field, role of middlemen, and training and knowledge on collection process. Table 1 depicts the operationalization of the dimensions of the research.

Table 1: Operationalization Table

Concept	Dimensions	Item	Reference
VEGETABLE COLLECTION PROCESS	**Transport**- to the market from the field	(i) Condition of road network (ii) Availability of vehicles for vegetable transportation (iii) Method of transportation (iv) Transportation cost	(McGregor & Gonemaitub, 2002)
	Packing and Packaging- at harvesting field	(i) Methods use for packing and packaging (ii) Types of material use for packing and packaging (iii) Awareness on the standardized packaging and packing methods (iv) Training received on the use of standardized packaging and packing methods	(Saurav & Neeraj, 2015)
	Role of middlemen	(i) Impact of middlemen on collection of vegetables (ii) Awareness of middlemen on the market demand and supply.	(Sandika, 2011)
	Training and knowledge – on collection process	(i) Level of awareness among farmers on proper collection of vegetables (ii) Training and knowledge on vegetable collection process	(Pudasaini, 1983)

The study was based on the primary data collected using a questionnaire from the farmers linked to the DDEC. Since some farmers did not have enough literacy level to fill the questionnaire, the researchers helped them to fill up the questionnaires. The questionnaire was having two sections: the first part consisted of the questions to retrieve respondents' demographic data. The second part consisted with the questions related to each dimension mentioned in the operationalization table (table 1). The sample of the study was 70 farmers linked to the DDEC. The sample was selected based on convenience sampling method. The reliability of the data collection tool was measured using the Cronbach's Alpha coefficient. A pilot survey with 15 respondents was conducted for the above purpose. The gathered data were presented and analyzed with the help of tables and figures.

Data Analysis

Most of the respondents of the sample were male (86 percent) and 21 percent of the famers had experience more than 10 years. Also, 11 percent were in the 18-25 age category and 21 percent of respondents from the 26-37 age category. The percentage from 38 – 47 age category was and 39 and the age category of 48-57 consisted with 39 percent farmers. From the sample, 23 percent of the respondents were qualified up to the G.C.E Ordinary Level while 20 percent had education up to the G.C.E Advanced Level. It was found that 17 percent respondents did not have any school educational at all. The researchers also found that there were 3 percent diploma holders and 3 percent bachelor's degree holders included in the sample. According to the information on monthly income of the respondents, 3 percent of them had an income level less than Rs 30,000.00, 14 percent in the range of Rs. 30,000.00 to Rs.50, 000.00 and 21 percent of the respondents were in the range of Rs. 51,000.00 – Rs. 80,000.00. Further, it was identified that 29 percent of the respondents were in the income range of Rs 81,000.00 – Rs 100,000.00 and most of them were having an income level above Rs 100,000.00 which was about 33 percent.

The time taken for vegetables to reach to the market from the field (figure 1) was analyzed and it was identified that majority of the farmers have less than 50 Km to reach the DDEC. Further, 15.7 percent of the

respondents were in between 50km – 100km and 11 percent of the respondents had a distance around 150km – 200km. Also, there were 10 percent respondents from more than 200km.

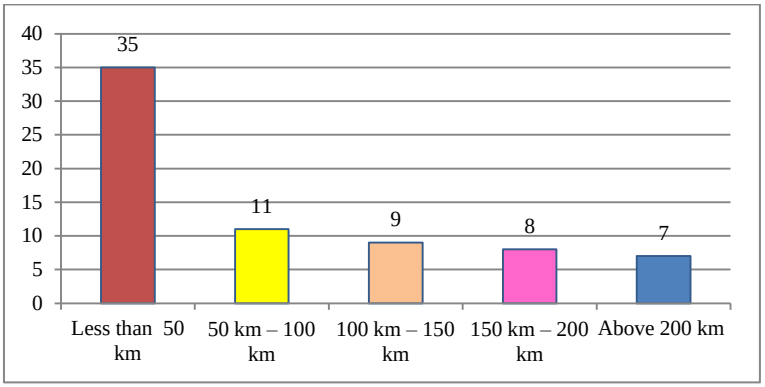

Figure 1: Distance from farm to the DDEC

According to Figure 2, the condition of the road network which leads to the DDEC was analyzed by the researchers and found that most of the respondents have mentioned that the road network is in a good condition. Around 64 percent of the respondents mentioned that the condition is very good. From the sample, 17 percent mentioned that the road is in a good condition while 5 percent of the respondents mentioned that the road network is in a bad condition.

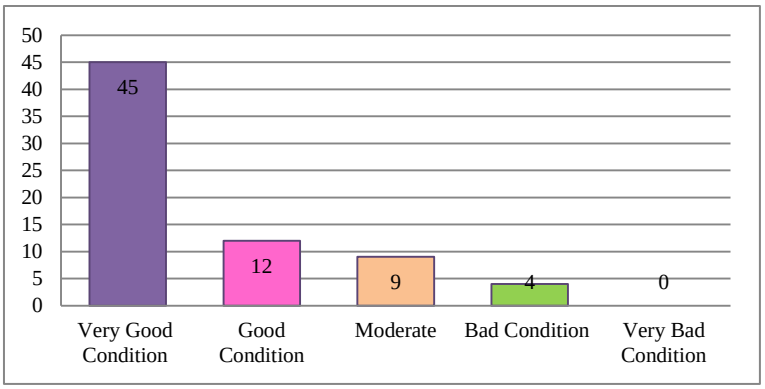

Figure 2: Road condition

It was examined whether there are enough transportation facilities to bring the harvest to the DDEC. Most of the participants, which was around 92.8 percent of the sample, have mentioned that there are enough transportation facilities for vegetables transport. It was found that most of the farmers tend to use cost-shared vehicles with few other farmers to deliver the vegetables to the DDEC. As the second option, they tend to use hired vehicles such as vans, lorries or three wheels. As the third option, some farmers tend to use their own vehicles and as the last option they tend to use public transportation to deliver vegetables to the DDEC. Most of the respondents mentioned that they are using Poly sac bags to pack the vegetables and it was ranked as the first. Wooden Boxes ranked as the second option used by many farmers to pack the vegetables. Plastic crates ranked in the third option and gunny bags ranked as the last place.

As depicted in Figure 3, when considering the level of awareness the farmers have on the standardized packaging, it was revealed that 50 percent of the respondents mentioned that they have a very less awareness on the standardized packaging and 28.5 percent of them mentioned that they have lesser awareness on the standardized methods used to pack the vegetables. However, 2.9 percent of the sample mentioned that they have very good and good awareness about standardized packaging.

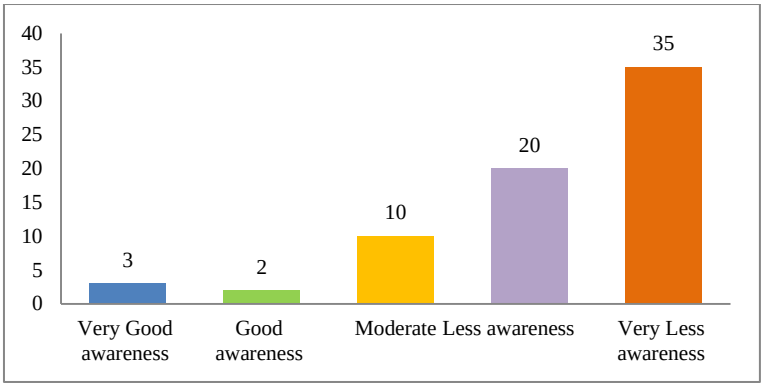

Figure 3: Awareness on the standardized packing

It was studied whether the farmers have received training from government or private sector on proper packaging of vegetables and 95.7 percent of the sample mentioned that they did not receive any training from government sector or private sector on this matter. As per Figure 4, the middlemen have a moderate level of impact on the vegetable collection process. From the participants, 20 percent strongly agreed that still the middlemen have an impact on the vegetable collection process while 14 percent of the participants just agreed that they have an impact on the process. However, majority of the respondents (44 percent) mentioned that they are moderately agreed with this factor and 11.4 percent of the respondents were strongly disagreed saying that the middlemen do not have any impact on the vegetable collection process.

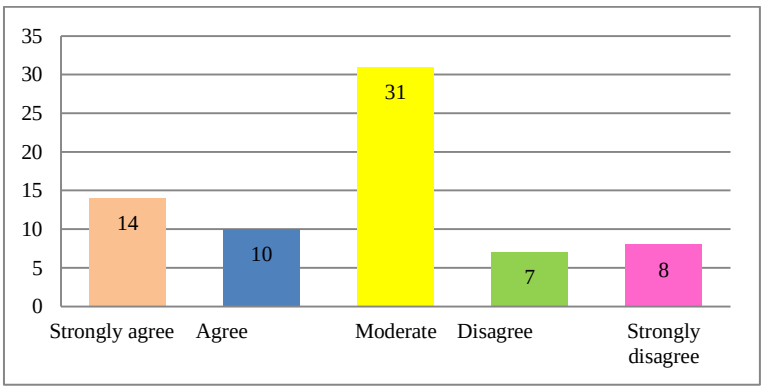

Figure 4: Impact of middlemen on vegetable collection process

According to the opinion of the farmers on whether the middlemen are helpful for the collection process, 63 percent mentioned that in the present context there is no help from the middlemen since the farmers tend to reach the DDEC directly with the development of the transportation facilities. However, 37 percent of the sample mentioned that middlemen are still helpful to the farmers in certain ways. As depicted in Figure 5, 14 percent of the respondents strongly agreed on that the middlemen have an understanding on the market demands and supply while majority of the sample (47 percent) were moderate with their answers and 10 percent disagreed. Further, 17 percent of the respondents were strongly agreed.

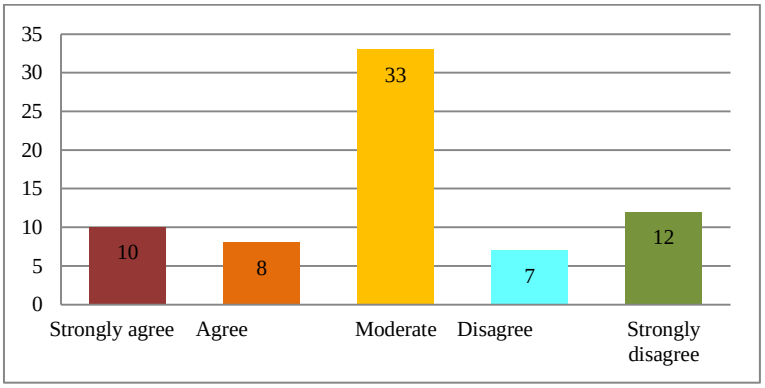

Figure 5: Understanding on the demand and supply in the vegetable market

Figure 6 revealed that the opinion of the farmers on the intervention of the government and private sector on the knowledge sharing of the standardized vegetable collection process.

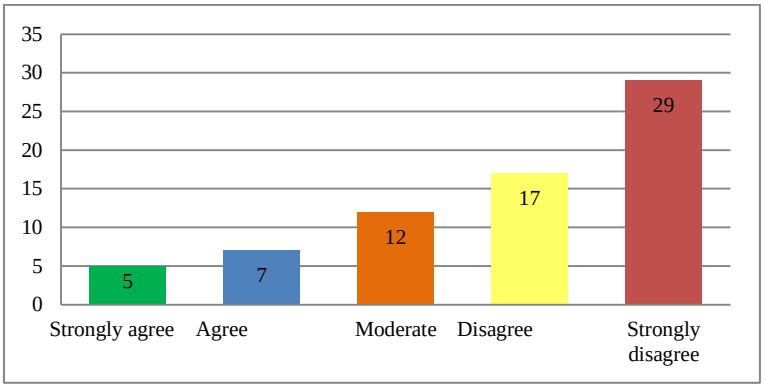

Figure 6: Government and private sector involvement on the knowledge sharing of the standardized vegetable collection process

Most of the participants were not agreed on the level of the intervention of the government and private sector on the knowledge sharing of the standardized vegetable collection process. Around 41.4 percent of the respondents were strongly disagreed and said there is no involvement from government or the private sector on training and knowledge sharing of the standardized vegetable collection process. However, 10 percent of the respondents were agreed on the above matter.

The researchers investigated the level of understanding which the participants have on the quality measures about the collection process. As presented in Figure 7, majority of the respondents do not have enough knowledge on the standardized quality measures of vegetable collection. From the sample, 38.6 percent of the respondents mentioned that they have very less knowledge about quality measures. However, 2.9 percent of the respondents of the sample have mentioned that they have a very good knowledge about the quality measures.

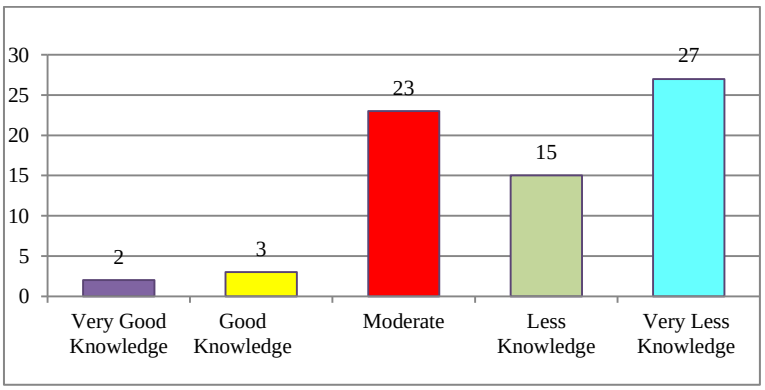

Figure 7: Knowledge on the standardized quality measures of vegetable collection

The awareness of the respondents on the standardized vegetable collection practices and processes were also at a lower level. According to Figure 8, many of the respondents (42.9 percent) mentioned that they are lacking knowledge and the awareness on the standardized collection practices and processes. However, 8.9 percent of the sample mentioned that they are somewhat moderately aware on the practices and the processes.

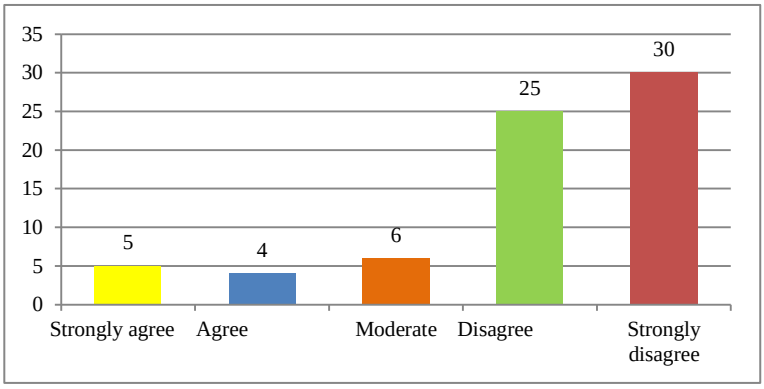

Figure 8: awareness of the standardized vegetable collection practices and processes

Conclusion

This research has explored the role of DDEC in collection of vegetables in Sri Lanka. Most of the farmers have mentioned that the road network which leads them to DDEC is in a good condition. Majority of the respondents mentioned that there are enough transportation facilities for them to reach the DDEC. It was found that majority of the farmers tend to use cost-shared vehicles with few other farmers to deliver the vegetables to the DDEC. Some farmers use public transport modes. The level of understanding among farmers on the quality practices and measures were very poor. Many of the respondents mentioned that they have a very less knowledge on the quality practices that needs to be used in handling vegetables properly and have a long shelf life. The participants were only aware on the quality practices which they were practicing for decades, and they are not aware of the current practices which are used by the international markets. Most of the farmers responded saying that they use poly sac bags or wooden boxes to transport vegetables from field to DDEC. Therefore, the materials they used to pack vegetables are poly materials or wood and most of them are not using plastic and composting materials to pack vegetables. The farmers have a very less awareness on the standardized packaging since there is less involvement from the government or the private sector on training them to match with the international levels. Further, farmers highlighted that they do not receive enough training on practicing standardized packaging. The respondents were having a low awareness on standardized packaging. Most of the respondents have mentioned that they hardly received any training or knowledge sharing from both private and government sector on proper packing of vegetables. There are practical difficulties to follow best practices in packing and packaging process due to the issues such as loading capacity, lack of specialized vehicles, unavailability of knowledge and training given on identification of proper packaging types and materials for different types of vegetables. It was identified that there is no proper training and awareness given to farmers on best practices of collection of vegetables. The middlemen and the DDEC play the role of the intermediator. However, middlemen's role is being failing though it was important before DDEC came to existence. The respondents have mentioned that the middlemen have less awareness or do not share the information about the market demand and supply of vegetables. Most of the farmers bring their products directly to the DDEC without involving the middlemen. Therefore, middlemen role could be removed as it would add cost to the product. Further, the role of middlemen will disappear if the modern technology and real time information systems are introduced to the DDEC operations and link the farmers to those systems.

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